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RESEARCH ARTICLE

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A revision of the hover fly genus *Amphoterus* Bezzi, 1915 (Diptera, Syrphidae) with the description of one new species

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Abstract

Amphoterus Bezzi, 1915 is a genus of rarely collected Afrotropical hover flies (Diptera, Syrphidae). We present the first description of the female of *A. braunsi* van Doesburg, 1956, redescribe the males of *A. braunsi* van Doesburg, 1956 and *A. cribratus* Bezzi, 1915, and describe a new species, *A. londti* **sp. nov.** We also provide the first colour photographs of two of the species, the first DNA barcodes for the genus and a key to identify the species.

Keywords

Afrotropical Region, flower fly, taxonomy

Introduction

The genus *Amphoterus* Bezzi, 1915 is a rare group of Afrotropical hover flies (Diptera, Syrphidae), known from only three published records. They are medium-sized (9–11 mm) with elongate antennae, dichoptic males and wing venation that resembles that of *Eumerus* Meigen, 1822 (Ssymank et al. 2021). It has been suggested that they

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might represent aberrant species of *Eumerus* (Whittington 2003) but it is accepted that the genus is valid (Smith and Vockeroth 1980; Dirickx 1998; Ssymank et al. 2021).

The genus was erected based on the single male type specimen of *Amphoterus cribratus* Bezzi, 1915 from Kenya (as British East Africa) (Bezzi 1915) (Fig. 1). Later, a female *A. cribratus* was described from Kalemie (as Albertville) (Fig. 1) in the eastern Democratic Republic of the Congo (Brunetti 1926) and a male *Amphoterus braunsi* van Doesburg, 1956 was described from Barberton in Mpumalanga (as Transvaal), South Africa (van Doesburg 1956) (Fig. 1). All three descriptions are brief and based on a single specimen and Brunetti (1926) and van Doesburg (1956) make their descriptions in reference to Bezzi's (1915) description only. In addition, the only published diagrams are a dorsal habitus drawing of the holotype male of *A. cribratus* (Bezzi 1915) and lateral habitus, lateral head and wing photographs of a female *A. braunsi* (Ssymank et al. 2021). The female of *A. braunsi* remains undescribed.

In the 65 years since van Doesburg (1956), several specimens of the genus have been accumulated in collections, including two female *A. braunsi* specimens collected by Jason Londt. Here, we redescribe the known males of *Amphoterus*, based on known and new material, describe the female of *A. braunsi* for the first time, describe a new species in the genus, provide high-quality images of all species and provide the first DNA barcodes for the genus.

Material and methods

Material of the following institutions was studied:

AMGS	Albany Museum, Makhanda, South Africa;
ICIPE	International Centre of Insect Physiology and Ecology, Nairobi, Kenya;
KMMA	Koninklijk Museum voor Midden-Afrika, Tervuren, Belgium;
NMSA	KwaZulu-Natal Museum, Pietermaritzburg, South Africa;
NHMUK	Natural History Museum, London, United Kingdom;
MZHC	Finnish Museum of Natural History, Helsinki, Finland;
RMNH	Naturalis Biodiversity Centre, Leiden, The Netherlands.

Despite searching the KMMA collection, the female *A. cribratus* described by Brunetti (1926) could not be located. The two specimens mentioned in De Meyer et al. (1995) are also missing (L. Njoroge pers. comm.).

Morphological terminology largely follows Cumming and Wood (2017) except that we used the suffixes pro-, meso- and meta- to refer to the first, second and third pair of legs or leg parts, respectively, pilosity to refer to hairs and pollinosity to refer to scutal microtrichia. Morphological observations were made with a Leica MZ8 stereomicroscope. Since the original description was very brief and used non-standard terminology, the male was redescribed to allow comparison with the female character states and indicate variation. Body length and wing length ranges given are minimum and maximum

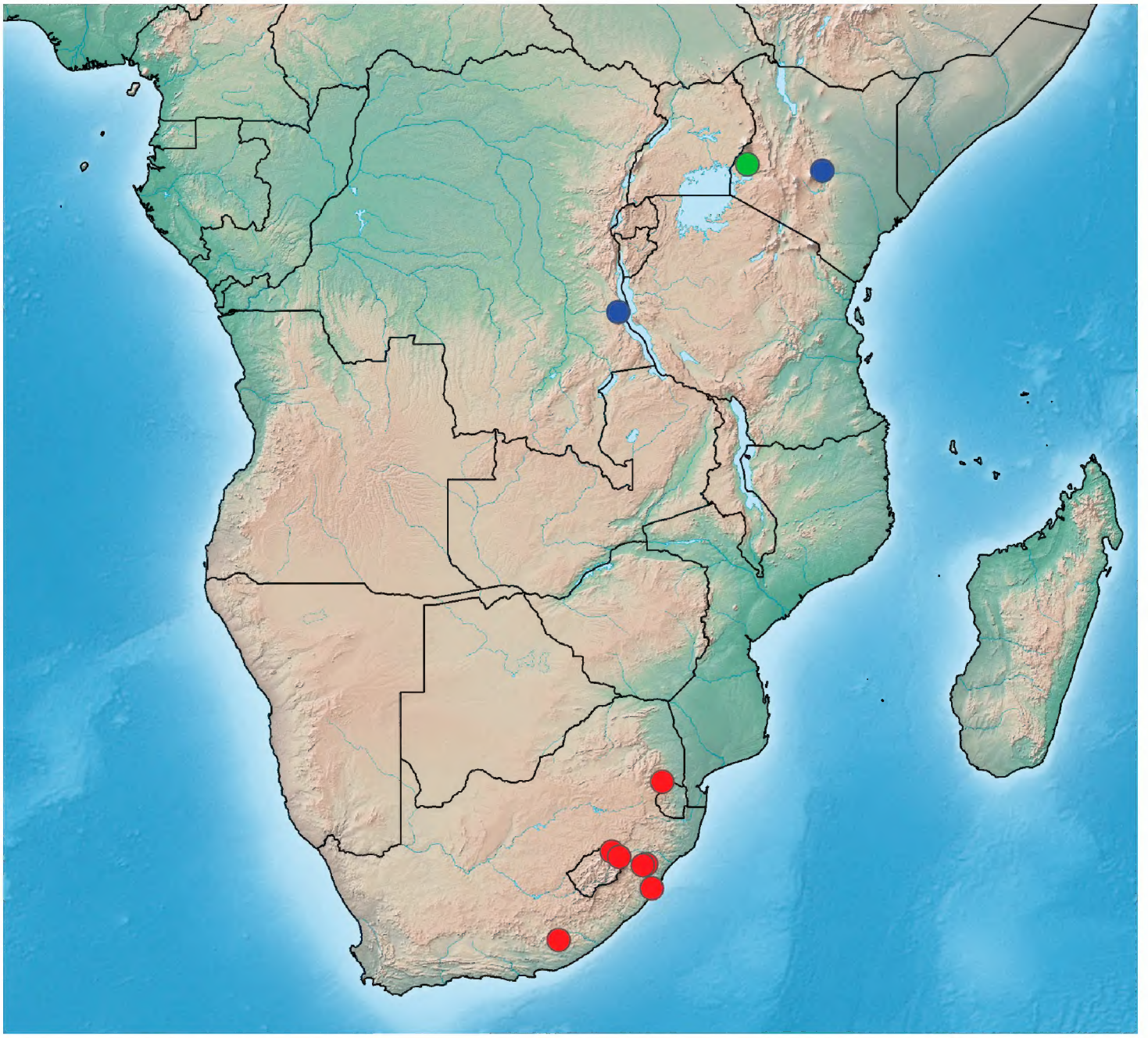


Figure 1. Distribution of *Amphoterus* species. Red: *A. braunsi*, green: *A. londti* sp. nov., blue: *A. cribratus*.

values observed in the studied material. Body measurements were taken between the frons and the posterior end of tergite IV; wing measurements were taken between the tegula and the apex of the wing. Stacking images were made using the set-up as outlined in Brecko et al. (2014) and stacking was done with the Zerene Stacker software (https://zerenesystems.com/cms/home). Literature references are given for the original taxon description. The distribution map was made using SimpleMappr (Shorthouse 2010).

Procedures for DNA barcoding followed Jordaens et al. (2015). To summarize, genomic DNA was extracted from a single leg using the NucleoSpin Tissue Kit (Macherey-Nagel, Düren), following the manufacturer's instructions. PCR reactions were undertaken in 25 µl reaction volumes, that contained 1.5 mM $MgCl_2$ in 1× PCR buffer (Invitrogen), 0.2 mM of each dNTP, 0.2 µM of each primer and 0.5 units of Taq polymerase (Invitrogen). The DNA barcode fragment of the mitochondrial cytochrome *c* oxidase subunit I (COI) gene was amplified using primer pair LCO1490 and HCO2198 (Folmer et al. 1994). The PCR profile was an initial denaturation step of 5 min at 95 °C, followed by 35 cycles of 45 s at 95 °C, 45 s at an annealing

temperature of 50 °C and 1.5 min at 72 °C, and ending with a final extension step of 5 min at 72 °C. PCR products were purified using the ExoSap protocol (Invitrogen) following the manufacturer's instructions. PCR-products were bidirectionally sequenced using the ABI PRISM BigDye Terminator v3.1 Cycle Sequencing Kit and run on an ABI3130xl Genetic Analyzer. Sequences were assembled in SEQSCAPE v2.5 (Life Technologies) and inconsistencies were checked by eye on the chromatogram. Uncorrected p-distances were calculated with MEGA v7 (Kumar et al. 2016). We did not attempt to obtain a DNA barcode for *A. cribratus* to avoid damaging the holotype, knowing that the specimen (collected > 100 years ago) was unlikely to yield a successful DNA barcode.

Results

Key to the species of *Amphoterus* (Figs 2–20)

1 All legs reddish brown, only coxae and bases of meta femorae and metatibiae darkened (Figs 7, 8); suture on thorax with contrasting golden fasciae (Figs 3, 4), which do not meet in the middle of the thorax; antenna dark reddish brown (Figs 11, 12); face with golden pollinosity and golden setae (Figs 11, 12); pedicel and postpedicel of the equal or subequal length ..... ***A. braunsi* van Doesburg**

– Legs black to very dark brown (Figs 9, 10); suture without golden fasciae (Figs 5, 6), uniform like the rest of the thorax; antenna black (Figs 13, 14); face with yellow or white silver pollinosity and white setae (Figs 13, 14) **2**

2 Postpedicel long, in female 4.1× as long as high (Fig. 14); face covered with white pollinosity; allula narrow, 2.9 times as long as broad; pedicel shorter than postpedicel (0.8:1) ..... ***A. londti* sp. nov.**

– Postpedicel 2.8 × as long as high (Fig. 13); face covered with yellow pollinosity; allula broader, 2.3 times as long as broad; pedicel longer than postpedicel (1.25:1)..... ***A. cribratus* Bezzi**

Species accounts

Amphoterus Bezzi, 1915

Amphoterus Bezzi, 1915: 116. Type species: *Amphoterus cribratus* Bezzi (by original designation).

Notes. *Amphoterus* species have bare eyes (not setulose as stated in Ssymank et al. 2021) and the antennae are elongate (short in *Eumerus* and *Megatrigon*) with a bare antennal arista. The body is dark (brown or black) and strongly punctate. The males are broadly dichoptic. The wing venation resembles that of *Eumerus* and *Megatrigon* with a nearly straight vein R_{4+5} and a recessive vein M_1.

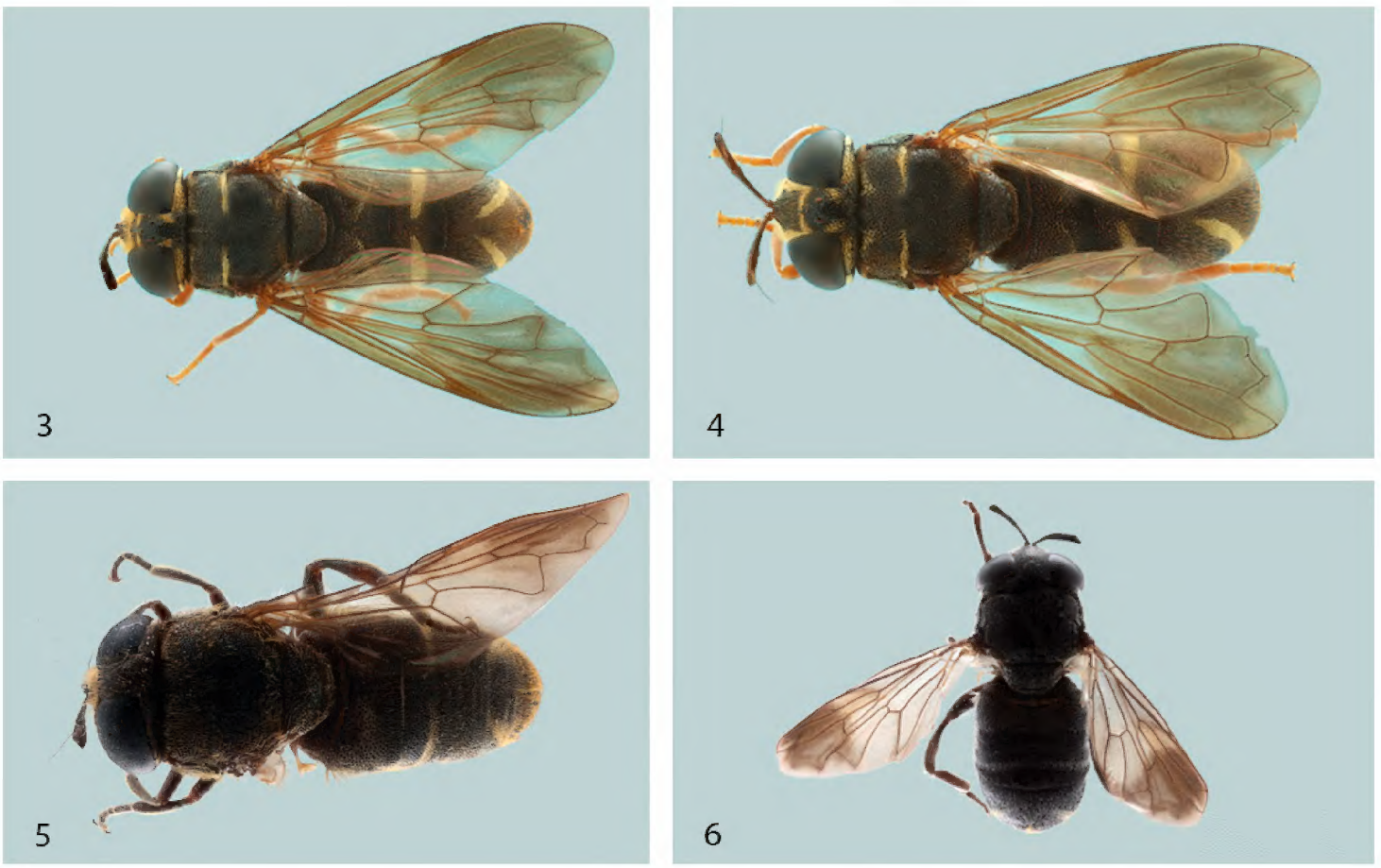
Figure 2. Live *Amphoterus braunsi*, collected from sunny patch in indigenous forest at Rainbow Gorge, KwaZulu-Natal, South Africa. Specimen at AMGS.

***Amphoterus braunsi* van Doesburg, 1956**
Figs 2, 3, 4, 7, 8, 11, 12, 15–17

Amphoterus braunsi van Doesburg, 1956, 22: 517.
Amphoterus braunsi van Doesburg – Smith and Vockeroth 1980: 497; Dirickx 1998: 4.
Eumerus braunsi (van Doesburg) – Whittington 2003, 10: 592. [citation only]

Material examined. ***Holotype*:** South Africa • 1♂; Mpumalanga, Barberton; Dr Brauns leg.; NMSA-Dip 051409, NMSA type number 731.

***Other material*:** South Africa • 1♂; Eastern Cape, Katberg; 15–30 Jan. 1933; R.E. Turner leg. (NHMUK). • 1♂; KwaZulu-Natal, Karkloof nr Mount Alida, Geekies Farm; 1500 m a.s.l.; 3 Jan. 1962; B. & P. Stuckenberg leg.; NMSA-Dip 052854 (NMSA). • 3♀♀; KwaZulu-Natal, Royal Natal National Park; 2828DB; late Jan. 1971; H. Townes leg.; NMSA-Dip 059707, 059708, 051873 (NMSA). • 1♂; KwaZulu-Natal, Karkloof, Geekies Farm; 2930AB; 21 Dec. 1983; B.R. Stuckenberg leg.; NMSA-Dip 056083 (NMSA). • 2♀♀; KwaZulu-Natal, Karkloof Nature Reserve; 29°18'10"S, 30°13'40"E; 1260 m a.s.l.; 10 Dec. 1987; J. & H. Londt leg.; Mixed *Podocarpus* forest edge; NMSA-Dip 059706, 064223 (NMSA). • 1♀; KwaZulu-Natal, Vernon Crookes Nature Reserve near Umzinto; 30°16'S, 30°36'E; 2–7 Nov. 2008; G. Davies leg.; RMCA DNA 165C02; NMSA-Dip 75216, GenBank: OQ706113 (NMSA). • 1♀; KwaZulu-Natal, Karkloof, near Benvie Farm; 29°15'36.8"S, 30°21'08"E; 1392 m a.s.l.; 10 Jan. 2015; M. Reemer



Figures 3–6. *Amphoterus* species, dorsal view **3** *A. braunsi* (♂) **4** *A. braunsi* (♀) **5** *A. cribratus* (♂) **6** *A. londti* sp. nov. (♀).

leg.; MRSA078; (RMNH). • 1♂ 1♀, KwaZulu-Natal, Karkloof Canopy tour forest; 29°19'18"S, 30°15'43"E; 03 Dec. 2017; G. Ståhls & E. Rättel leg.; http://id.luomus.fi/GJ.2928, Stahls_Y2423, GenBank: OQ706109 (MZHC). • 1♀; KwaZulu-Natal, Karkloof, Shawswood; -29.30356, 30.30606; 12 Nov. 2020; J. Midgley leg.; NMSA-Dip 206396 (NMSA). • 1♂ 2♀♀; KwaZulu-Natal, Karkloof, Shawswood; -29.30356, 30.30606; 24 Nov. 2020; J. Midgley leg.; RMCA DNA 1370E06, 1370E07, 1370E08; NMSA-Dip 206389, 206390, 206391, GenBank: OQ706110, OQ706111, OQ706112 (NMSA). • 2♀♀; KwaZulu-Natal, Karkloof, Shawswood; 9 Jan. 2021; L. Mva leg.; NMSA-Dip 209856, 209857 (NMSA). • 1♂ 1♀ KwaZulu-Natal, Didima, Rainbow Gorge forest, -28.959933, 29.226848; 22 Jan. 2023; T. Bellingan, K. Jordaens & J. Midgley leg. (RMCA). • 1♂ 1♀ KwaZulu-Natal, Didima, Rainbow Gorge forest, -28.959933, 29.226848; 23 Jan. 2023; T. Bellingan, K. Jordaens & J. Midgley leg. (AMGS).

Description. Male: length 9.5–9.7 mm, wing: 7.5–8 mm.

***Head*:** Eyes broadly dichoptic. Face dark brown; golden yellow pilose; evenly dense golden yellow pollinose. Gena dark brown; golden yellow pilose; sparse golden yellow pollinose. Oral opening occupies about ½ of width between eyes. Frons dark brown; golden yellow pilose; golden yellow pollinose, with a bare patch above the antennae and a bare band between the eyes about ⅔ of the way to form the antennal bases to the anterior ocellus, with a short suture from the angle of the eye extending about 1/6 of the width of the frons on the bare band. Ocellar triangle dark brown; bare anteriorly, with golden brown to dark brown pilosity posteriorly; lacking pollinosity. Ocellar triangle obtuse, distance between posterior ocelli 1.5 times the distance between anterior

ocellus and posterior ocellus. Occiput dark brown; golden yellow to golden brown pilose, darker dorsally and paler laterally; golden yellow pollinose laterally, bare dorsally. Eye bare, facets of equal size across eye. Scape short, brown, with a few thick dark brown hairs at the dorsoapical and ventroapical margins, lateroapical margins bare. Antenna with pedicel elongate, about as long as postpedicel, 4.1 times as long as high, brown, covered in stout dark brown hairs, sparser basally, some white pollinosity near apex. Postpedicel elongate, 3.1 times as long as high, dorsal and ventral margin almost parallel basally, widest at ¾ of length, rounded apically; slightly darker brown than basal antennal segments and darker at apex; sparse white pollinose. Arista brown.

***Thorax*:** Scutum dark brown, punctate; postpronotum, the lateral part of the transverse suture and the posterior part of the postalar callus paler, brownish yellow; golden yellow pilose, with denser patches at the posterior margin between the postalar calli, with some darker brown pilosity on the margin between the suture and the postalar callus and on the postalar callus; with a horizontal vitta of sparse golden yellow pollinosity from the postpronotum to in line with the posterior corner of the eye and a horizontal vitta of dense golden yellow pollinosity along the transverse suture and three vittae of sparse white pollinosity, one medial and two mediolateral, reaching from the anterior margin of the scutum to in line with the suture. Scutellum with flattened apical rim, dark brown, golden yellow pilose. Posterior anepisternum, anterior anepimeron and dorsal katepisternum with pale pilosity which is golden yellow dorsally gradually becoming white ventrally. Katatergite with thin, fine golden pilosity. Anterior anepisternum, katepisternum, katepimeron and meron with sparse white pollinosity, which extends slightly onto the posterior anepisternum and anepimeron. Metasternum with white pilosity.

***Legs*:** Reddish brown, except for the coxa, which is dark brown and the metafemur and metatibia, which have some darker markings; golden yellow pilose and a few darker pile on the tarsus. Metafemur somewhat thickened medially, with a shallow, darkened suture posteroventrally at middle of length; metatibia expanded apically, with a small groove ventrally at middle of length. Metabasitarsus large, as thick as metatibia and as long as other tarsal segments combined.

***Wing*:** Brown infuscated, darker anterior to the spurious vein, sometimes with a small hyaline patch at the base of cell r_1. Cell r_1 open for about ⅓ of its length. Vein R_{2+3} straight for most of its length, turning sharply upwards as it joins the wing margin. Vein R_{4+5} straight. Crossvein *r-m* with a bend posteriorly, at about ⅔ of length of vein where the spurious vein would cross crossvein *r-m*. Vein M_1 recessive, with one or two appendices projecting towards the wing margin. Cell *dm* usually with a single appendix at posterior corner. Spurious vein weak, indistinct, only visible as a thickened fold. Entire wing microtrichose. Alula about 2.2 times as long as broad. Calypter yellowish, with long golden yellow pilosity. Haltere stem brown basally, becoming lighter distally, knob white.

***Abdomen*:** Punctate, dark brown, with yellow golden pilosity. Tergite (hereafter "T") 2 somewhat trapezoidal, about half as long as wide, with longer pilosity at anterior corners, anterolateral and dorsomedial sections raised somewhat, with diagonal vittae of golden yellow pollinosity in the grooves between these sections. T3 parallel sided, about half as long as wide, with diagonal vittae of golden yellow pollinosity in shallower

grooves than T2. T4 parallel sided anteriorly, rounded posteriorly, about as long as wide, evenly rounded dorsally, diagonal golden yellow pollinose vittae not in grooves.

***Genitalia*:** Hypandrium broad in lateral view, cerci trapezoid (Figs 15–17).

Female (as for male, except as noted): length 8.3–10.4 mm, wing 6.7–8.5 mm.

***Head*:** Dense golden yellow pollinosity over most of the face, but with two vittae of less dense pollinosity running from base of antennae to outer oral margin. Ocellar triangle obtuse, distance between posterior ocelli 1.6 times the distance between anterior ocellus and posterior ocellus. Frons more extensively bare than in male, golden yellow pilosity limited to lateral margins and a thin vitta bellow ocellar triangle, without sutures. Pedicel similar colour brown to basal antennal segments.

***Thorax*:** Entire postalar calli pale.

***Wing*:** Vein M_1 often with a third appendix projecting into cell r_{4+5}. Allula 2.1 times as long as broad.

***Abdomen*:** T2 parallel sided.

Comments. Compared to other species in the genus, a large number of specimens of *A. braunsi* are available for study. This is likely due to higher collecting effort in South Africa than in other African countries and not necessarily an indication of relative abundance. Several collecting events resulted in multiple specimens, suggesting that adults of this species may be abundant at particular times or in particular habitats. In specimens where habitat information is available, individuals were collected from indigenous forests. From our own observations, they are collected in sunny patches with or without flowers, where they rest on leaves or flowers (Fig. 2). Detailed flower visiting information is not available at present.

Amphoterus cribratus Bezzi, 1915

Figs 5, 9, 13, 18–20

Amphoterus cribratus Bezzi, 1915: 117.
Amphoterus cribratus Bezzi – Brunetti 1926, 13: 166; Smith and Vockeroth 1980: 497; De Meyer et al. 1995: 7; Dirickx 1998: 5.
Eumerus cribratus (van Doesburg) – Whittington 2003, 10: 592. [citation only]

Material examined. ***Holotype*:** Kenya • 1♂; British East Africa; T. J. Anderson leg.; NHMUK 010861152.

Description. Male: length 9.5 mm, wing: 8.2 mm.

***Head*:** Eyes broadly dichoptic. Face pale brown; yellowish white pilose; covered with dense yellow pollinosity. Gena pale brown; white pilose; with white pollinosity. Oral opening occupies about ⅓ of the distance between eyes. Frons reddish brown, with a short suture from the angle of the eye extending about ⅓ of the width of the frons, yellowish white pilose ventrally, darkening to pale brown dorsally; dense yellow pollinosity restricted to the area below the suture, though some sparse pollinosity may be present between the suture and the ocellar triangle. Ocellar triangle reddish brown; with sparse yellow to pale brown pilosity; lacking pollinosity. Ocellar triangle obtuse, posterior ocelli 1.25 times as far apart as the distance between anterior ocellus and

Figures 7–10. *Amphoterus* species, lateral view **7** *A. braunsi* (♂) **8** *A. braunsi* (♀) **9** *A. cribratus* (♂) **10** *A. londti* sp. nov. (♀).

posterior ocellus. Occiput reddish brown; pale brown pilose; sparsely yellowish white pollinose laterally, bare dorsally. Eye bare, facets of equal size across the eye. Scape short, reddish brown, with a few pale brown spines at the dorsoapical margin, lateroapical and ventroapical margins bare. Pedicel elongate, 1.25 times as long as postpedicel, 5 times as long as high, dark brown, covered in stout dark brown hairs, sparsely white pollinose. Postpedicel elongate, 2.8 times as long as high, dorsal and ventral margin almost parallel basally, widest at ¾ of length, dorsal margin sloping downwards in final ¼ and rounded ventroapically; dark brown; sparse white pollinose. Arista reddish brown.

***Thorax*:** Scutum brown, punctate; postpronotum, the lateral part of the transverse suture and the postalar callus paler, brownish yellow; golden brown pilose, with longer, denser patches at the posterior margin between the postalar calli, and with longer pilosity on the postalar callus; with a horizontal vitta of sparse white pollinosity from the postpronotum to in line with the posterior corner of the eye and a horizontal vitta of sparse white pollinosity along the transverse suture and five vertical vittae of sparse white pollinosity, one medial and two mediolaterally reaching from the anterior margin of the scutum to ¾ of the distance to the suture and two laterally, between postpronotum and postalar calli. Scutellum with flattened apical rim, brown, yellow pilose, pilosity longer on rim. Posterior anepisternum, anterior anepimeron and dorsal katepisternum with golden pilosity. Katatergite with thin, fine golden pilosity. All lateral sclerites with white pollinosity, sparse on dorsal anepisternum. Metasternum with pale yellow pilosity.

***Legs*:** Dark brown, except for the metafemur, which has some darker markings, and metatibia, which has a pale brown patch posteromedially; with pale yellow to

white pilosity. Metafemur somewhat thickened medially, metatibia expanded apically, with a small groove venteromedially. Metabasitarsus large, as thick as metatibia and as long as other metatarsal segments combined.

***Wing*:** grey infuscated in distal region, from subcostal anteriorly to branch of veins R_{2+3} and R_{4+5}, to crossvein *r-m* to posterior margin of *dm*, hyaline basally. Cell r_1 open for about ¼ of its length. Vein R_{2+3} straight for most of its length, turning sharply upwards as it joins the wing margin. Vein R_{4+5} straight. Crossvein *r-m* virtually straight. Vein M_1 recessive, with two appendices projecting towards the wing margin. Cell *dm* with a single appendix at posterior corner. Spurious vein developed, though less than other veins. Wing microtrichose over most of the surface, bare only in posterobasal part of cell *br*, basal part of cell *bm*, anterobasal part of cell *cup* and anterior part of alula. Allula 2.3 times as long as broad. Calypter yellowish white, with darker margin, with long white pilosity. Haltere stem brown basally, becoming lighter distally, knob yellow.

***Abdomen*:** Punctate, brown, with pale yellow pilosity anteriorly, yellow orange pilosity on apex of final segment. T2 slightly trapezoidal, about 2.5 times as wide as long, with longer pilosity at anterior corners, anterolateral and dorsomedial sections raised somewhat, with grooves between these sections, with white pollinosity from the anterior margin to the grooves, posteromedial section without pollinosity. T3 parallel sided, about 4 times as wide as long, with shallower grooves than T2, with a transverse vitta of white pollinosity on the anterior margin and diagonal vittae of white pollinosity from the medial part of the transverse vitta to the margin of the tergite. T4 parallel sided anteriorly, rounded posteriorly, about as long as wide, evenly rounded dorsally, without grooves; with a transverse vitta of white pollinosity on the anterior margin and diagonal vittae of white pollinosity from the medial part of the transverse vitta to the margin of the tergite.

***Genitalia*:** Hypandrium narrow in lateral view, cerci rounded (Figs 18–20).

Comments. Bezzi (1915) describes the integument as black, but the holotype has brown integument with black punctation. This may be degradation, as other specimens from this collection appear to have lightened similarly (e.g., the *A. braunsi* specimen from Katberg, South Africa), or may be an interpretation error due to the quality of historic microscopes and light sources. Integument colouration should be interpreted with care in *Amphoterus*. The female described by Brunetti (1926) and specimens mentioned in De Meyer et al. (1995) could not be located and are considered lost. The figure caption in Bezzi (1915) refers to a female specimen, but the description is of a male, correctly referred to as such in the text. Likewise, Brunetti (1926) refers to the holotype in text as both female (line 16, page 166) and male (line 17, page 166). These are both likely typological errors.

Amphoterus londti sp. nov.

https://zoobank.org/759CC7CE-350A-4FFD-9024-2F4370D6A4E1

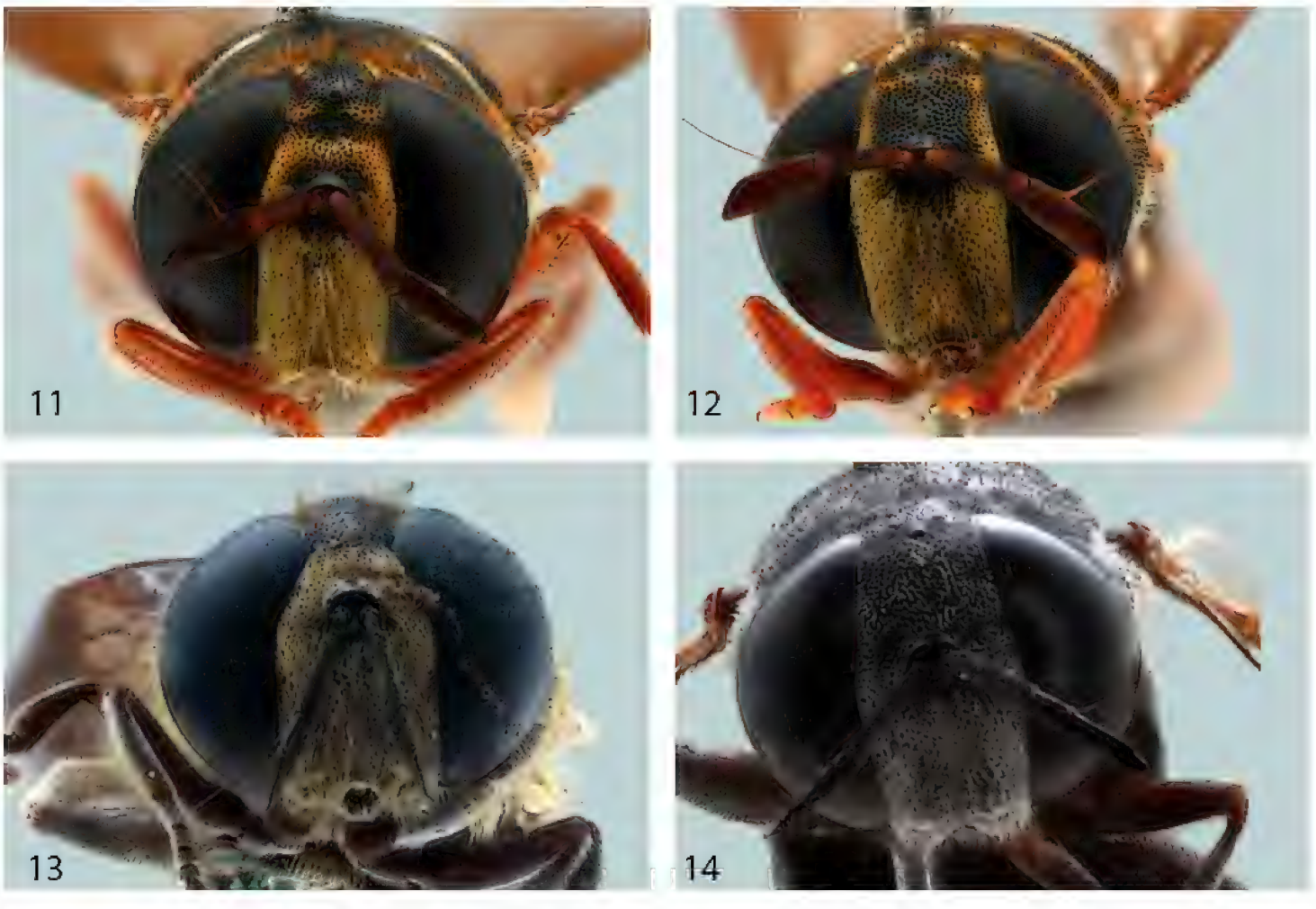
Figs 6, 10, 14

Material examined. ***Holotype*:** Kenya • 1♀; Eastern Province, Kibwe Forest; 2.41649°S, 37.95560°E; 925 m a.s.l.; 18 Nov.–2 Dec. 2017; R. Copeland leg.; Malaise trap in indigenous forest; RMCA DNA 1300E02; ICIPE 2973, GenBank: OQ706114 (ICIPE).

Diagnosis. Distinguishable from the other known species in the genus by the narrow alula which is almost three times as long as broad (slightly more than twice as long as broad in others) the long postpedicel, which is about 4.1 times as long as high (2.8–3.1 times in other species); the pedicel is shorter than the postpedicel (0.8:1) (longer in *A. cribratus* (1.25:1) or equal in length in *A. braunsi*), and the white pollinosity of the face (yellow to golden in other species).

Description. Female: length 9.2 mm, wing: 7.1 mm.

***Head*:** Face black; white pilose; covered with dense white pollinosity but with two vittae of less dense pilosity running from base of antennae to outer oral margin. Gena black; white pilose; with white pollinosity. Oral opening occupies about ⅓ of distance between eyes. Frons black; white pilose; dense white pollinosity restricted to ventrolateral corners and eye margin, though some sparse pollinosity may be present below ocellar triangle, without sutures. Ocellar triangle black; with sparse white to pale yellow pilosity; lacking pollinosity. Ocellar triangle obtuse, distance between posterior ocelli 1.7 times the distance between anterior ocellus and posterior ocellus. Occiput black; white to pale grey pilose, darker dorsally and paler laterally; white pollinose laterally, bare dorsally. Eye bare, facets of equal size across eye. Scape short, dark brown, with a few black spines at the dorsoapical margin and thinner hairs at the ventroapical margin, lateroapical margins bare. Pedicel elongate, 0.8 times as long as postpedicel, 7.5 times as long as high, dark brown, covered in stout black hairs dorsally, ventrally and laterally, with white spines medially, sparser basally, white pollinose. Postpedicel elongate, 4.1 times as long as high, dorsal and ventral margin almost parallel basally,



Figures 11–14. *Amphoterus* heads, frontal view **11** *A. braunsi* (♂) **12** *A. braunsi* (♀) **13** *A. cribratus* (♂) **14** *A. londti* sp. nov. (♀).

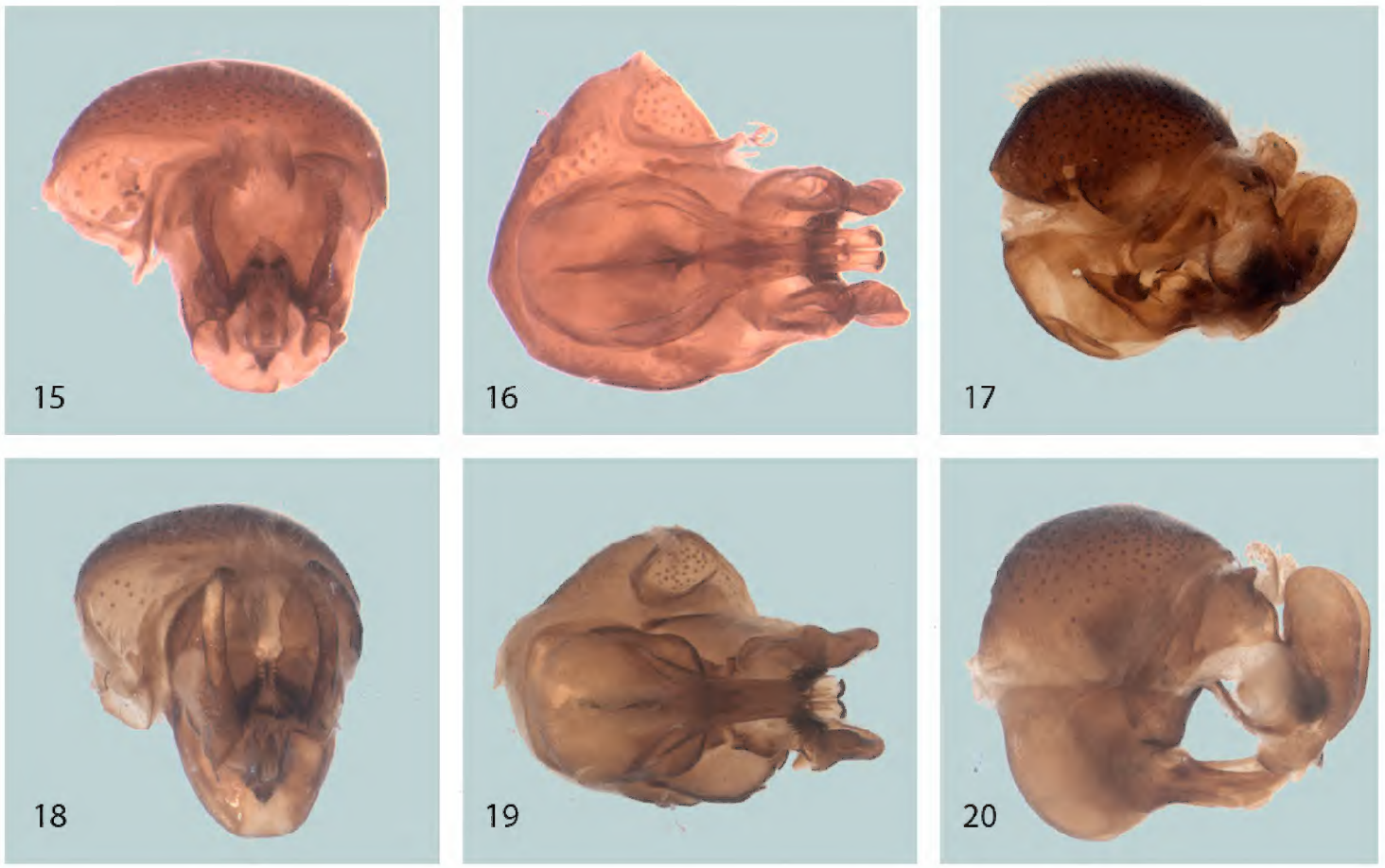
widest at ¾ of length, dorsal margin sloping downwards in final ¼ and rounded venteroapically; dark brown; sparse white pollinose. Arista brown.

***Thorax*:** Scutum black, punctate; postpronotum, the lateral part of the transverse suture and the postalar callus paler, brownish yellow; pale yellow to white pilose, with denser patches at the posterior margin between the postalar calli, with some darker brown pilosity on the margin between the suture and the postalar callus and with longer white pilosity on the postalar callus; with a horizontal vitta of sparse white pollinosity from the postpronotum to in line with the posterior corner of the eye and a horizontal vitta of sparse white pollinosity along the transverse suture and five vertical vittae of sparse white pollinosity, one medial and two mediolaterally reaching from the anterior margin of the scutum to in line with the suture and two laterally, between postpronotum and postalar calli. Scutellum with flattened apical rim, black, pale yellow to white pilose, pilosity longer on rim. Posterior anepisternum, anterior anepimeron and dorsal katepisternum with white pilosity. All lateral tergites with white pollinosity, sparse on dorsal anepisternum. Metasternum with white pilosity.

***Legs*:** Dark brown, except for the metafemur, which has some black markings, and metatibia, which has a pale brown patch posteromedially; with pale yellow to white pilosity. Metafemur somewhat thickened medially, metatibia expanded apically, with a small groove venteromedially. Metabasitarsus large, as thick as metatibia and as long as other tarsal segments combined.

***Wing*:** grey infuscated in distal region, from subcostal anteriorly to branch of veins R_{2+3} and R_{4+5}, to crossvein *r-m* to posterior margin of cell *dm*, hyaline basally. Cell r_1 open for about ¼ of its length. Vein R_{2+3} straight for most of its length, turning sharply upwards as it joins the wing margin. Vein R_{4+5} straight. Crossvein *r-m* with a bend posteriorly, at about ⅔ of length of vein where the spurious vein would cross crossvein *r-m*. Vein M_1 recessive, with two appendices projecting towards the wing margin. Cell *dm* with a single appendix at posterior corner. Spurious vein developed, though less than other veins. Wing microtrichose over most of the surface, bare only in basal 1/6 of cell r_1, anterior margin and posterobasal part of cell *br*, basal part of cell *bm*, basal part of cell *cua*, anterobasal part of cell *cup*, and anterior part of alula. Allula 2.9 times as long as broad. Calypter white, with long white pilosity. Haltere stem brown basally, becoming lighter distally, knob yellow.

***Abdomen*:** Punctate, black, with pale yellow to white pilosity anteriorly, yellow orange pilosity on apex of final segment. T2 parallel sided, about 2.5 times as wide as long, with longer pilosity at anterior corners, anterolateral and dorsomedial sections raised somewhat, with grooves between these sections; with white pollinosity from the anterior margin to the grooves, posteromedial section without pollinosity. T3 parallel sided, about 4 times as wide as long, with shallower grooves than T2; with a transverse vitta of white pollinosity on the anterior margin and diagonal vittae of white pollinosity from the medial part of the transverse vitta to the margin of the tergite. T4 parallel sided anteriorly, rounded posteriorly, about as long as wide, evenly rounded dorsally, without grooves; with a transverse vitta of white pollinosity on the anterior margin and diagonal vittae of white pollinosity from the medial part of the transverse vitta to the margin of the tergite.



Figures 15–20. *Amphoterus* male genitalia **15–17** *A. braunsi* **15** apical view **16** ventral view **17** lateral view **18–20** *A. cribratus* **18** apical view **19** ventral view **20** lateral view.

Etymology. The new species is named in honour of Dr Jason Londt, who not only collected material used in this study, but a wide variety of other Afrotropical Syrphidae. The specific epithet should be treated as a noun in the genitive case.

Comments. The male of the species is unknown.

DNA barcodes

We obtained six DNA barcodes which were submitted to GenBank under accession numbers OQ706109–OQ706114. The mean intraspecific p-distance within the five *A. braunsi* DNA barcodes was very low (0.004), while the mean interspecific p-distance between *A. braunsi* and the single *A. londti* was 0.05 and of a magnitude of what is observed between Afrotropical Eristalinae (Jordaens et al. 2015).

Discussion

We have revised the genus *Amphoterus*, providing detailed descriptions, photographs and DNA barcodes for the first time. The genus now contains three recognised species. Information on the genus is sparse, and this work is the first taxonomic contribution in more than 65 years (Bezzi 1915; Brunetti 1926; van Doesburg 1956).

In taxa that are seldom collected, it can be difficult to accurately link conspecific males and females. While the advent of DNA barcoding has made this easier, this

does not solve the problem for old specimens (Jordaens et al. 2015). Furthermore, specimens that were not kept in optimal conditions may also not yield DNA barcodes.

Enough male and female specimens of *A. braunsi* were studied to give some insight into sexual dimorphism. Males and females showed a high degree of similarity, and the differences that are present appear subtle. In contrast, the male of *A. cribratus* and female of *A. londti* show other differences between each other (e.g., the long and narrow alula and the long post pedicel). The description of the female *A. cribratus* (Brunetti 1926) also differs from the specimen of *A. londti* (particularly in the pattern of pollinosity on the scutum and tergite 4), while we observed little intra specific variation in the females of *A. braunsi*. Notably, Brunetti (1926) did not mention the antennal morphology, suggesting that he did not observe a difference between the sexes of *A. cribratus*, but the long postpedicel is a notable feature in *A. londti*. These observations support our decision that they are not conspecific, despite occurring in the same general area. Kenya is an ecologically diverse country containing three biodiversity hotspots (Marchese 2015). Regions within Kenya have distinct floras and faunas and the specimens may come from different regions within the country. Further collecting of *Amphoterus* in East and Central Africa may result in more specimens of these species becoming available for study, which may elucidate habitat preferences.

Despite the low number of specimens of *A. braunsi* available for study, multiple collecting events resulted in more than one specimen being collected. Three specimens were collected over eight weeks using Malaise traps at Shawswood (KwaZulu-Natal, South Africa) and a further three being hand-collected on one day during this period. Four specimens were also collected in two days at Rainbow Gorge (KwaZulu-Natal, South Africa). This suggests that, while never high in abundance, adults show distinct temporal patterns and may be locally common in certain habitats or at certain times.

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